

**WARREN COUNTY SCHOOL DISTRICT**

PLANNED INSTRUCTION

**COURSE DESCRIPTION**

**Course Title:** Calculus BC  
**Course Number:** 00293  
**Course Prerequisites:** AP Calculus AB with an average of 60% or above.

**Course Description:** AP Calculus BC is intended for accelerated students who have a thorough knowledge of the complete academic with honors sequence. It is designed to develop and reinforce the fundamental functional behavior of the following topics: differentiation, integration, infinite series, three-dimensional space, vectors, conic sections, polar coordinates, and parametric equations.

**Suggested Grade Level:** Grade 12  
**Length of Course:** Two Semesters  
**Units of Credit:** 1

**PDE Certification and Staffing Policies and Guidelines (CSPG) Required Teacher Certifications:**

CSPG #50 Mathematics

To find the CSPG information, go to [CSPG](#)

**Certification verified by the WCSD Human Resources Department:**  Yes  No

**WCSD STUDENT DATA SYSTEM INFORMATION**

**Course Level:** AP & Dual Enrollment (.33) GPA +3%

**Mark Types:** Check all that apply.

F – Final Average  MP – Marking Period  EXM – Final Exam

**GPA Type:**  GPAEL-GPA Elementary  GPAML-GPA for Middle Level  NHS-National Honor Society

UGPA-Non-Weighted Grade Point Average  GPA-Weighted Grade Point Average

**State Course Code:** 02125

To find the State Course Code, go to [State Course Code](#), download the Excel file for SCED, click on SCED 6.0 tab, and chose the correct code that corresponds with the course.

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**TEXTBOOKS AND SUPPLEMENTAL MATERIALS**

**Board Approved Textbooks, Software, and Materials:**

**Title:** Calculus AP  
**Publisher:** Cengage Learning (Larson/Battaglia)  
**ISBN #:** 9781337286886  
**Copyright Date:** 2018  
**WCSD Board Approval Date:** 6/29/2020

**Supplemental Materials:** [Click or tap here to enter text.](#)

**Curriculum Document**

**WCSD Board Approval:**

**Date Finalized:** 6/5/2020  
**Date Approved:** 6/29/2020  
**Implementation Year:** 2020-2021

**SPECIAL EDUCATION, 504, and GIFTED REQUIREMENTS**

The teacher shall make appropriate modifications to instruction and assessment based on a student's Individual Education Plan (IEP), Chapter 15 Section 504 Plan (504), and/or Gifted Individual Education Plan (GIEP).

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**SCOPE AND SEQUENCE OF CONTENT, CONCEPTS, AND SKILLS**

<b>Performance Indicator</b>	<b>PA Core Standard and/or Eligible Content</b>	<b>Month Taught and Assessed for Mastery</b>
Find limits graphically, algebraically, and using tables.	Click or tap here to enter text.	September October
Find limits at infinity and infinite limits.	Click or tap here to enter text.	September October
Use the Squeeze Theorem.	Click or tap here to enter text.	September October
Identify x-values for which a function is not continuous; determine removable and non-removable discontinuities.	Click or tap here to enter text.	September October
Identify horizontal and vertical asymptotes of graphs.	Click or tap here to enter text.	September October
Graphically estimate the slope of a curve at a given point.	Click or tap here to enter text.	September October
Determine the differentiability of a function.	Click or tap here to enter text.	September October
Find the derivative of a function using the definition of derivative, basic derivative rules, product rule, quotient rule, and chain rule.	Click or tap here to enter text.	September October
Find the equation of a line tangent to a curve at a given point.	Click or tap here to enter text.	September October
Find the derivative using implicit differentiation.	Click or tap here to enter text.	September October
Find derivatives of trigonometric functions.	Click or tap here to enter text.	September October
Find higher-order derivatives.	Click or tap here to enter text.	September October
Complete application problems involving velocity and rates of change.	Click or tap here to enter text.	September October
Solve related-rate word problems.	Click or tap here to enter text.	September October
Identify absolute and relative extrema of a function and determine the value of the derivative at indicated extrema.	Click or tap here to enter text.	September October
Identify intervals on which a function is increasing/decreasing and concave up/down.	Click or tap here to enter text.	September October
Find the critical numbers of a function.	Click or tap here to enter text.	September October
Determine whether Rolle's Theorem can be applied to a function on an indicated interval. If Rolle's Theorem can be applied, find all values of c in the interval such that $f'(c) = 0$ .	Click or tap here to enter text.	September October
Apply the Mean Value Theorem to a function on an indicated interval and explain why the Mean Value Theorem does not apply to certain functions.	Click or tap here to enter text.	September October
Apply the First and Second Derivative tests to identify relative extrema.	Click or tap here to enter text.	September October
Identify points of inflection for a function.	Click or tap here to enter text.	September October

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Sketch the graph of an equation using extrema, intercepts, symmetry, asymptotes, concavity, points of inflection and intervals of increasing and decreasing.	Click or tap here to enter text.	September October
Complete optimization problems involving area, volume, and business applications.	Click or tap here to enter text.	September October
Find sums given Sigma notation and use Sigma notation to write sums given by an expression.	Click or tap here to enter text.	September October
Set up and evaluate indefinite integrals.	Click or tap here to enter text.	September October
Use upper and lower sums to approximate the area of a region using the indicated number of subintervals.	Click or tap here to enter text.	September October
Set up and evaluate definite integrals of algebraic and trigonometric functions using the limit process, geometrically as an accumulation process and, using the Fundamental Theorem of Calculus.	Click or tap here to enter text.	September October
Apply the Mean Value Theorem for Integrals for a function over a given interval.	Click or tap here to enter text.	September October
Integrate to find a function $F(x)$ and demonstrate the Second Fundamental Theorem of Calculus by differentiating the result.	Click or tap here to enter text.	September October
Evaluate definite and indefinite integrals using substitution.	Click or tap here to enter text.	September October
Use the Trapezoidal Rule and Simpson's Rule to approximate the value of a definite integral for an indicated value of $n$ .	Click or tap here to enter text.	September October
Find the first and higher-order derivatives of exponential functions, logarithmic functions (base $e$ and other bases), and inverse trigonometric functions.	Click or tap here to enter text.	October November
Find indefinite integrals and evaluate definite integrals involving exponential functions, logarithmic functions (base $e$ and other bases), and inverse trigonometric functions.	Click or tap here to enter text.	October November
Interpret the relationship between slope fields with the solution curves of differential equations and use slope fields to approximate solutions to differential equations.	Click or tap here to enter text.	October November
Find the general solution of a differential equation and use initial conditions to find particular solutions of differential equations.	Click or tap here to enter text.	October November
Solve differential equations using separation of variables.	Click or tap here to enter text.	October November
Use Euler's Method to approximate solutions of differential equations.	Click or tap here to enter text.	October November
Use exponential functions and differential equations to model and solve applied problems.	Click or tap here to enter text.	October November
Solve and analyze logistic differential equations.	Click or tap here to enter text.	October November
Find the area of a region bounded by two or more curves.	Click or tap here to enter text.	November December
Find the volume of a solid formed by revolving a region about the $x$ -axis, $y$ -axis, and lines other than the axes.	Click or tap here to enter text.	November December
Find the arc length of a smooth curve.	Click or tap here to enter text.	November December

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Find the area of a surface of revolution.	Click or tap here to enter text.	November December
Find integrals using integration by parts.	Click or tap here to enter text.	December January
Solve trigonometric integrals involving powers of sine and cosine, powers of secant and tangent, trigonometric substitution, and products of sine and cosine.	Click or tap here to enter text.	December January
Use partial fraction decomposition with linear and quadratic factors to integrate rational functions.	Click or tap here to enter text.	December January
Evaluate an indefinite integral using a table of integrals.	Click or tap here to enter text.	December January
Evaluate an improper integral has an infinite limit of integration and improper integrals that have an infinite discontinuity.	Click or tap here to enter text.	December January
Apply L'Hopital's Rule to evaluate a limit.	Click or tap here to enter text.	December January
Determine whether a series converges or diverges using the nth-Term Test fir Divergence, the Integral Test, the Direct Comparison Test, the Alternating Series Test, the Ratio Test, the Limit Comparison test, and the Root Test.	Click or tap here to enter text.	January February
Classify a convergent series as absolutely or conditionally convergent.	Click or tap here to enter text.	January February
Understand the definition of a Power Series.	Click or tap here to enter text.	January February
Find a geometric power series that represents a function.	Click or tap here to enter text.	January February
Find a Taylor and Maclaurin series for a function.	Click or tap here to enter text.	January February
Use properties of p-series and harmonic series.	Click or tap here to enter text.	January February
Find Taylor and Maclaurin polynomial approximations of elementary functions.	Click or tap here to enter text.	January February
Find the radius and interval of convergence of a power series.	Click or tap here to enter text.	January February
Determine endpoint convergence of a power series.	Click or tap here to enter text.	January February
Differentiate and integrate a power series.	Click or tap here to enter text.	January February
Sketch the graph of a curve and find the slope of a tangent line to a curve given a set of parametric equations and in polar form.	Click or tap here to enter text.	March April
Eliminate the parameter in a set of parametric equations.	Click or tap here to enter text.	March April
Find a set of parametric equations to represent a curve.	Click or tap here to enter text.	March April
Find the arc length of a curve given by a set of parametric equations and in polar form.	Click or tap here to enter text.	March April
Calculate the area of a surface of revolution in parametric form and in polar form.	Click or tap here to enter text.	March April
Rewrite rectangular coordinates and equations in polar form.	Click or tap here to enter text.	March April
Find the points of intersection of two polar graphs.	Click or tap here to enter text.	March April

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Calculate the area of a region bounded by a polar graph.	Click or tap here to enter text.	March April
Write a vector in component form and as a linear combination.	Click or tap here to enter text.	April May
Understand the 3-D rectangular coordinate system.	Click or tap here to enter text.	April May
Use properties of the dot product of two vectors and use the dot product to find the angle between two vectors.	Click or tap here to enter text.	April May
Perform vector operations including the cross product and interpret the results graphically.	Click or tap here to enter text.	April May
Use vectors to solve problems involving force and velocity.	Click or tap here to enter text.	April May
Analyze vectors in space.	Click or tap here to enter text.	April May
Use 3-D vectors to solve real world problems.	Click or tap here to enter text.	April May
Find the direction cosines of a vector in space.	Click or tap here to enter text.	April May
Analyze and sketch a space curve given by a vector-valued function.	Click or tap here to enter text.	April May
Extend the concepts of limits, continuity, differentiation, and integration to vector-valued functions.	Click or tap here to enter text.	April May
Describe the velocity and acceleration associated with a vector-valued function.	Click or tap here to enter text.	April May
Use vector-valued functions to analyze projectile motion.	Click or tap here to enter text.	April May

**ASSESSMENTS**

**PSSA Academic Standards, Assessment Anchors, and Eligible Content:** The teacher must be knowledgeable of the PDE Academic Standards, Assessment Anchors, and Eligible Content and incorporate them regularly into planned instruction.

**Formative Assessments:** The teacher will utilize a variety of assessment methods to conduct in-process evaluations of student learning.

**Effective formative assessments for this course include:** Suggested but not limited to: Bell Ringers, Exit Tickets, Cooperative Learning, Observations, Written Work, Quizzes, Oral Response, Self-Evaluation, and Homework

**Summative Assessments:** The teacher will utilize a variety of assessment methods to evaluate student learning at the end of an instructional task, lesson, and/or unit.

**Effective summative assessments for this course include:** Suggested but not limited to: Performance Assessment, Chapter/Unit Tests, and Projects